

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 December 2001 (20.12.2001)

PCT

(10) International Publication Number
WO 01/96689 A1

(51) International Patent Classification⁷: E04F 15/04, B44F 9/02, B44C 5/04, 1/24

(81) Designated States (national): AI, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DI (utility model), DK, DM, DZ, BE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(21) International Application Number: PCT/BR01/00097

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, IS, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SI, TR), OAPI patent (BJ, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NI, SN, TD, TG).

(22) International Filing Date: 12 June 2000 (12.06.2000)

Published:

with international search report
before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(25) Filing Language: English

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(26) Publication Language: English

(30) Priority Data:
2000/0381 13 June 2000 (13.06.2000) BR

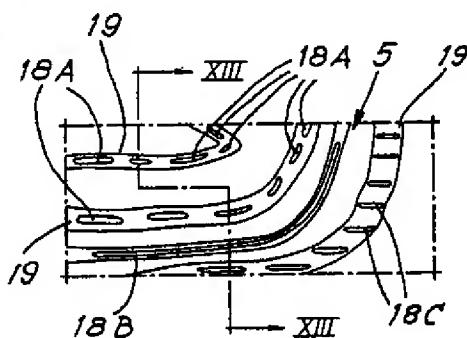
(71) Applicant: UNILIN BEHEER B.V. [NL/NL]; Hoogeveenweg 28, NL-2913 JV Nieuwerkerk A/D IJssel (NL).



(72) Inventor: THIERS, Bernard, Paul, Joseph; Stationsstraat 134, B-8780 Oostrozebeke (BE).

WO 01/96689 A1

(74) Agent: DONNE, E.; Bureau M.F.J. Bockstaal NV, Arenbergstraat 13, B-2000 Antwerpen (BE).



(54) Title: FLOOR COVERING, FLOOR PANELS, METHOD FOR THEIR REALIZATION

(57) Abstract: Floor covering, consisting of hard panels, with a laminated structure, whereby at least at the upper surface a printed decorative layer (16) with a wood pattern (5) is present, with thereupon a transparent layer of synthetic material (17) in which impressions (18A-18B-18C) are formed, characterized in that the impressions (18A-18B-18C) substantially follow the wood pattern (5).

FLOOR COVERING, FLOOR PANELS, METHOD FOR THEIR REALIZATION

5 This invention relates to a floor covering, more particularly of the type consisting of hard panels, as well as to floor panels for forming such floor covering, and a method for realizing such floor panels.

10 In particular, it relates to a floor covering formed of laminated panels, also called laminated parquet.

15 It is known that with such laminated parquet, the appearance of wood is imitated by providing the floor panels at their upper surface with a decorative layer printed with a wood pattern, on top of which a transparent layer of synthetic material is provided.

20 Mostly, the printed decorative layer consists of printed paper. Usually, the layer of synthetic material consists of an synthetic resin or one or more transparent or translucent material layers soaked in synthetic resin, in which possibly products can be worked in, in order to enhance, for example, the wear and tear resistance of the final surface.

25 The printed decorative layer and the layer of synthetic material are provided on an underlying basic layer, which can be realized according to different techniques.

30 So, for example, this is possible by soaking the decorative layer in resin and bringing it, after hardening, together with said layer of synthetic material, which then preferably also consists of a thin transparent paper layer also soaked in resin, and together with a basic layer and possible other layers,

into a press and compressing it, under the supply of heat, to one hardened whole. This technique is known under the denomination of DPL (Direct Pressure Laminate).

5 Of course, other techniques are possible, too. So, for example, first a top layer may be formed which, amongst others, comprises the aforementioned decorative layer and the layer of synthetic material present thereupon, after
10 which this top layer is attached on a basic layer or basic structure.

Also, said basic layer may consist of different materials or material layers. A material often used to this end is MDF (Medium Density Fibre board), HDF (High Density Fibre board), respectively.
15

It is also known that impressions can be realized in the transparent layer of synthetic material, this in order to obtain an imitation of wood pores and other unevennesses
20 which can be present at the surface of real wood. With the known embodiments, this is performed by simply providing a series of impressions in the floor panels, which impressions substantially extend according to one and the same direction. Notwithstanding the use of such
25 impressions, the known embodiments show the disadvantage that the imitation effect still is not optimum. So, for example, they show the disadvantage that, if one looks at such floor panels at a relatively small angle, a light refraction at the transparent layer of synthetic matter
30 is created, as a result of which only a glossy surface can be seen, without any visible effect of the actual print being perceived.

The invention aims at a floor covering, and more particularly at floor panels, whereby the top layer has technical characteristics which contribute to a considerable
35

improvement of the imitation of the wood pattern, or at least the visual perception of this wood pattern, and whereby the aforementioned disadvantages of the known embodiments are minimized.

5

To this aim, the invention thus relates to a floor covering, consisting of hard panels, with a laminated structure, whereby at least at the upper surface a printed decorative layer with a wood pattern is present, with thereupon a transparent layer of synthetic material in which impressions are formed, with as a characteristic that the impressions substantially follow the wood pattern, with which it is meant that they substantially are provided in function of the wood pattern. Hereby, it is preferred that the impressions follow the wood pattern substantially in longitudinal direction as well as substantially in transverse direction and in directions situated in between.

20

Thereby, a technical solution is offered for letting the printed pattern seem more real, without the necessity of refining the printing technique itself in an expensive manner, which is very important with laminated panels provided with such printed pattern. By having the impressions run not only substantially according to one well-defined direction, then, when a person moves over the floor covering, an effect is obtained that the light incidence moves, as a result of which, so to speak, a living light effect is created. Also, a better depth effect is obtained, and the colours of the printed pattern are better perceptible.

25

As usual with the known laminated parquet panels, the printed decorative layer preferably consists of paper, however, other materials, either on the basis of cellulose or not, are not excluded. Moreover, this

30

35

decorative layer can be processed in different manners, for example, previous to the application thereof on the underlying basic layer, soaked in a synthetic resin or such.

5

The aforementioned layer of synthetic material, which, according to the invention, is situated on top of the decorative layer, can be composed in any manner. By "transparent layer of synthetic material", it is meant that this layer comprises synthetic material, as well as, in applied condition, is sufficiently transparent for perceiving the printed wood pattern. This layer of synthetic material itself may comprise other materials than synthetic material, as well as be composed of several sublayers.

10
15
20
25

Preferably, this transparent layer of synthetic material, as usual with known laminated parquet panels, consists of a synthetic resin or one or more transparent or translucent material layers soaked in synthetic resin, for example, very thin transparent layers of paper.

In the layer of synthetic material, substances may be present by which the wear and tear resistance of the surface is enhanced.

30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
335
340
345
350
355
360
365
370
375
380
385
390
395
400
405
410
415
420
425
430
435
440
445
450
455
460
465
470
475
480
485
490
495
500
505
510
515
520
525
530
535
540
545
550
555
560
565
570
575
580
585
590
595
600
605
610
615
620
625
630
635
640
645
650
655
660
665
670
675
680
685
690
695
700
705
710
715
720
725
730
735
740
745
750
755
760
765
770
775
780
785
790
795
800
805
810
815
820
825
830
835
840
845
850
855
860
865
870
875
880
885
890
895
900
905
910
915
920
925
930
935
940
945
950
955
960
965
970
975
980
985
990
995
1000
1005
1010
1015
1020
1025
1030
1035
1040
1045
1050
1055
1060
1065
1070
1075
1080
1085
1090
1095
1100
1105
1110
1115
1120
1125
1130
1135
1140
1145
1150
1155
1160
1165
1170
1175
1180
1185
1190
1195
1200
1205
1210
1215
1220
1225
1230
1235
1240
1245
1250
1255
1260
1265
1270
1275
1280
1285
1290
1295
1300
1305
1310
1315
1320
1325
1330
1335
1340
1345
1350
1355
1360
1365
1370
1375
1380
1385
1390
1395
1400
1405
1410
1415
1420
1425
1430
1435
1440
1445
1450
1455
1460
1465
1470
1475
1480
1485
1490
1495
1500
1505
1510
1515
1520
1525
1530
1535
1540
1545
1550
1555
1560
1565
1570
1575
1580
1585
1590
1595
1600
1605
1610
1615
1620
1625
1630
1635
1640
1645
1650
1655
1660
1665
1670
1675
1680
1685
1690
1695
1700
1705
1710
1715
1720
1725
1730
1735
1740
1745
1750
1755
1760
1765
1770
1775
1780
1785
1790
1795
1800
1805
1810
1815
1820
1825
1830
1835
1840
1845
1850
1855
1860
1865
1870
1875
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
2105
2110
2115
2120
2125
2130
2135
2140
2145
2150
2155
2160
2165
2170
2175
2180
2185
2190
2195
2200
2205
2210
2215
2220
2225
2230
2235
2240
2245
2250
2255
2260
2265
2270
2275
2280
2285
2290
2295
2300
2305
2310
2315
2320
2325
2330
2335
2340
2345
2350
2355
2360
2365
2370
2375
2380
2385
2390
2395
2400
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
2460
2465
2470
2475
2480
2485
2490
2495
2500
2505
2510
2515
2520
2525
2530
2535
2540
2545
2550
2555
2560
2565
2570
2575
2580
2585
2590
2595
2600
2605
2610
2615
2620
2625
2630
2635
2640
2645
2650
2655
2660
2665
2670
2675
2680
2685
2690
2695
2700
2705
2710
2715
2720
2725
2730
2735
2740
2745
2750
2755
2760
2765
2770
2775
2780
2785
2790
2795
2800
2805
2810
2815
2820
2825
2830
2835
2840
2845
2850
2855
2860
2865
2870
2875
2880
2885
2890
2895
2900
2905
2910
2915
2920
2925
2930
2935
2940
2945
2950
2955
2960
2965
2970
2975
2980
2985
2990
2995
3000
3005
3010
3015
3020
3025
3030
3035
3040
3045
3050
3055
3060
3065
3070
3075
3080
3085
3090
3095
3100
3105
3110
3115
3120
3125
3130
3135
3140
3145
3150
3155
3160
3165
3170
3175
3180
3185
3190
3195
3200
3205
3210
3215
3220
3225
3230
3235
3240
3245
3250
3255
3260
3265
3270
3275
3280
3285
3290
3295
3300
3305
3310
3315
3320
3325
3330
3335
3340
3345
3350
3355
3360
3365
3370
3375
3380
3385
3390
3395
3400
3405
3410
3415
3420
3425
3430
3435
3440
3445
3450
3455
3460
3465
3470
3475
3480
3485
3490
3495
3500
3505
3510
3515
3520
3525
3530
3535
3540
3545
3550
3555
3560
3565
3570
3575
3580
3585
3590
3595
3600
3605
3610
3615
3620
3625
3630
3635
3640
3645
3650
3655
3660
3665
3670
3675
3680
3685
3690
3695
3700
3705
3710
3715
3720
3725
3730
3735
3740
3745
3750
3755
3760
3765
3770
3775
3780
3785
3790
3795
3800
3805
3810
3815
3820
3825
3830
3835
3840
3845
3850
3855
3860
3865
3870
3875
3880
3885
3890
3895
3900
3905
3910
3915
3920
3925
3930
3935
3940
3945
3950
3955
3960
3965
3970
3975
3980
3985
3990
3995
4000
4005
4010
4015
4020
4025
4030
4035
4040
4045
4050
4055
4060
4065
4070
4075
4080
4085
4090
4095
4100
4105
4110
4115
4120
4125
4130
4135
4140
4145
4150
4155
4160
4165
4170
4175
4180
4185
4190
4195
4200
4205
4210
4215
4220
4225
4230
4235
4240
4245
4250
4255
4260
4265
4270
4275
4280
4285
4290
4295
4300
4305
4310
4315
4320
4325
4330
4335
4340
4345
4350
4355
4360
4365
4370
4375
4380
4385
4390
4395
4400
4405
4410
4415
4420
4425
4430
4435
4440
4445
4450
4455
4460
4465
4470
4475
4480
4485
4490
4495
4500
4505
4510
4515
4520
4525
4530
4535
4540
4545
4550
4555
4560
4565
4570
4575
4580
4585
4590
4595
4600
4605
4610
4615
4620
4625
4630
4635
4640
4645
4650
4655
4660
4665
4670
4675
4680
4685
4690
4695
4700
4705
4710
4715
4720
4725
4730
4735
4740
4745
4750
4755
4760
4765
4770
4775
4780
4785
4790
4795
4800
4805
4810
4815
4820
4825
4830
4835
4840
4845
4850
4855
4860
4865
4870
4875
4880
4885
4890
4895
4900
4905
4910
4915
4920
4925
4930
4935
4940
4945
4950
4955
4960
4965
4970
4975
4980
4985
4990
4995
5000
5005
5010
5015
5020
5025
5030
5035
5040
5045
5050
5055
5060
5065
5070
5075
5080
5085
5090
5095
5100
5105
5110
5115
5120
5125
5130
5135
5140
5145
5150
5155
5160
5165
5170
5175
5180
5185
5190
5195
5200
5205
5210
5215
5220
5225
5230
5235
5240
5245
5250
5255
5260
5265
5270
5275
5280
5285
5290
5295
5300
5305
5310
5315
5320
5325
5330
5335
5340
5345
5350
5355
5360
5365
5370
5375
5380
5385
5390
5395
5400
5405
5410
5415
5420
5425
5430
5435
5440
5445
5450
5455
5460
5465
5470
5475
5480
5485
5490
5495
5500
5505
5510
5515
5520
5525
5530
5535
5540
5545
5550
5555
5560
5565
5570
5575
5580
5585
5590
5595
5600
5605
5610
5615
5620
5625
5630
5635
5640
5645
5650
5655
5660
5665
5670
5675
5680
5685
5690
5695
5700
5705
5710
5715
5720
5725
5730
5735
5740
5745
5750
5755
5760
5765
5770
5775
5780
5785
5790
5795
5800
5805
5810
5815
5820
5825
5830
5835
5840
5845
5850
5855
5860
5865
5870
5875
5880
5885
5890
5895
5900
5905
5910
5915
5920
5925
5930
5935
5940
5945
5950
5955
5960
5965
5970
5975
5980
5985
5990
5995
6000
6005
6010
6015
6020
6025
6030
6035
6040
6045
6050
6055
6060
6065
6070
6075
6080
6085
6090
6095
6100
6105
6110
6115
6120
6125
6130
6135
6140
6145
6150
6155
6160
6165
6170
6175
6180
6185
6190
6195
6200
6205
6210
6215
6220
6225
6230
6235
6240
6245
6250
6255
6260
6265
6270
6275
6280
6285
6290
6295
6300
6305
6310
6315
6320
6325
6330
6335
6340
6345
6350
6355
6360
6365
6370
6375
6380
6385
6390
6395
6400
6405
6410
6415
6420
6425
6430
6435
6440
6445
6450
6455
6460
6465
6470
6475
6480
6485
6490
6495
6500
6505
6510
6515
6520
6525
6530
6535
6540
6545
6550
6555
6560
6565
6570
6575
6580
6585
6590
6595
6600
6605
6610
6615
6620
6625
6630
6635
6640
6645
6650
6655
6660
6665
6670
6675
6680
6685
6690
6695
6700
6705
6710
6715
6720
6725
6730
6735
6740
6745
6750
6755
6760
6765
6770
6775
6780
6785
6790
6795
6800
6805
6810
6815
6820
6825
6830
6835
6840
6845
6850
6855
6860
6865
6870
6875
6880
6885
6890
6895
6900
6905
6910
6915
6920
6925
6930
6935
6940
6945
6950
6955
6960
6965
6970
6975
6980
6985
6990
6995
7000
7005
7010
7015
7020
7025
7030
7035
7040
7045
7050
7055
7060
7065
7070
7075
7080
7085
7090
7095
7100
7105
7110
7115
7120
7125
7130
7135
7140
7145
7150
7155
7160
7165
7170
7175
7180
7185
7190
7195
7200
7205
7210
7215
7220
7225
7230
7235
7240
7245
7250
7255
7260
7265
7270
7275
7280
7285
7290
7295
7300
7305
7310
7315
7320
7325
7330
7335
7340
7345
7350
7355
7360
7365
7370
7375
7380
7385
7390
7395
7400
7405
7410
7415
7420
7425
7430
7435
7440
7445
7450
7455
7460
7465
7470
7475
7480
7485
7490
7495
7500
7505
7510
7515
7520
7525
7530
7535
7540
7545
7550
7555
7560
7565
7570
7575
7580
7585
7590
7595
7600
7605
7610
7615
7620
7625
7630
7635
7640
7645
7650
7655
7660
7665
7670
7675
7680
7685
7690
7695
7700
7705
7710
7715
7720
7725
7730
7735
7740
7745
7750
7755
7760
7765
7770
7775
7780
7785
7790
7795
7800
7805
7810
7815
7820
7825
7830
7835
7840
7845
7850
7855
7860
7865
7870
7875
7880
7885
7890
7895
7900
7905
7910
7915
7920
7925
7930
7935
7940
7945
7950
7955
7960
7965
7970
7975
7980
7985
7990
7995
8000
8005
8010
8015
8020
8025
8030
8035
8040
8045
8050
8055
8060
8065
8070
8075
8080
8085
8090
8095
8100
8105
8110
8115
8120
8125
8130
8135
8140
8145
8150
8155
8160
8165
8170
8175
8180
8185
8190
8195
8200
8205
8210
8215
8220
8225
8230
8235
8240
8245
8250
8255
8260
8265
8270
8275
8280
8285
8290
8295
8300
8305
8310
8315
8320
8325
8330
8335
8340
8345
8350
8355
8360
8365
8370
8375
8380
8385
8390
8395
8400
8405
8410
8415
8420
8425
8430
8435
8440
8445
8450
8455
8460
8465
8470
8475
8480
8485
8490
8495
8500
8505
8510
8515
8520
8525
8530
8535
8540
8545
8550
8555
8560
8565
8570
8575
8580
8585
8590
8595
8600
8605
8610
8615
8620
8625
8630
8635
8640
8645
8650
8655
8660
8665
8670
8675
8680
8685
8690
8695
8700
8705
8710
8715
8720
8725
8730
8735
8740
8745
8750
8755
8760
8765
8770
8775
8780
8785
8790
8795
8800
8805
8810
8815
8820
8825
8830
8835
8840
8845
8850
8855
8860
8865
8870
8875
8880
8885
8890
8895
8900
8905
8910
8915
8920
8925
8930
8935
8940
8945
8950
8955
8960
8965
8970
8975
8980
8985
8990
8995
9000
9005
9010
9015
9020
9025
9030
9035
9040
9045
9050
9055
9060
9065
9070
9075
9080
9085
9090
9095
9100
9105
9110
9115
9120
9125
9130
9135
9140
9145
9150
9155
9160
9165
9170
9175
9180
9185
9190
9195
9200
9205
9210
9215
9220
9225
9230
9235
9240
9245
9250
9255
9260
92

relatively short impressions are applied, now longer impressions can be applied, for example, with lengths of 3 cm or more, or even over the entire length of a wood nerve.

5

It is noted that by the term "wood pattern", different aspects of such wood pattern can be understood. So, for example, may the impressions, or at least a number of the impressions, be provided in function of the course of the wood nerves of the printed wood pattern, however, according to a variant, which either can be combined with the preceding or not, impressions are provided which are applied in function, and more particularly at the location, of the so-called wood pores of the printed wood pattern. Wood pores mostly are dark, often strip-shaped specks in wood, which up to now have been particularly difficult to imitate. In the first place, this problem is pertinent when imitating oak, where often less nerves are present, however, the wood pores are very important. By providing, according to the invention, impressions at the location of these wood pores, the imitated specks will almost have the look of real pores.

In the most preferred forms of embodiment, the floor covering, and more particularly each floor panel concerned, will be provided with impressions which are obtained by means of a pressing mould, more particularly pressing plate, the relief of which was realized by means of image-processing technology, starting from a wood pattern, either an image of a wood pattern or a real wood pattern. Hereby, one starts from the same wood pattern than the one of the print of the decorative layer.

Of course, the invention also relates to floor panels for realizing the floor covering described in the foregoing.

Further, the invention also relates to a method for realizing such floor panel, which method is characterized in that the aforementioned impressions are applied in said layer of synthetic material by means of a pressing mould, more particularly a pressing plate. Of course, the pressing plate is provided with a relief, more particularly protruding parts, such that impressions are formed which, as aforementioned, follow the printed wood pattern and/or are realized in function of this wood pattern.

Preferably, hereby use is made of a pressing mould, more particularly a pressing plate, the relief of which was realized by means of image-processing technology, starting from a wood pattern, either an image of a wood pattern or a real wood pattern. By realizing said relief by means of image-processing, a true copy is obtained. More particularly, for forming, on one hand, the pressing plate and, on the other hand, the patterns to be printed, it is started from one and the same wood pattern, with the advantage that the relief and the printed pattern can be perfectly attuned to each other.

Of course, the results obtained by image-processing can be processed further.

It is also not excluded to determine the locations where the impressions have to be realized and therefore also the relief of the pressing plate in other ways, for example, by starting from an image of a wood pattern, to determine the locations and shapes of the desired impressions, either by means of or with the support of a computer program.

According to the invention, during image-processing, preferably a separation is performed, on one hand, for

forming one or more image layers and, on the other hand, for forming one or more structural layers. A separation for image layers already is a known technique and is necessary for being able to print the different colours.

5 According to the invention, now still an additional separation is performed for the aforementioned structural layers, in other words, for forming said relief at the pressing plate or such. To this end, an image of the wood pattern is made and, by means of image-processing
10 technology, an image is formed therefrom which determines the position, and possibly also the depth and the size, of the impressions, after which, by means thereof, a pressing plate is realized, for example, by means of etching techniques or any other technique. It is evident
15 that for the image processing for creating, starting from, for example, the pattern of a real piece of wood, an image which is suitable for forming the relief, different image-processing programs, possibly especially designed to this aim can be applied.

20

Preferably, the floor panels are realized according to the classical technique which is applied for forming DPL (Direct Pressure Laminate), with the only difference that a pressure mould, more particularly, a pressing plate is

25 applied in the usual production press which is provided with a relief by which impressions, such as mentioned in the foregoing, are formed. As usual, the floor panels hereby are formed from larger plates. These plates are formed by bringing a basic layer, more particularly a base plate, together with the decorative layer and the layer of synthetic material, and possible other layers, in a heated press and compressing them to a whole, whereby said synthetic resins provide for adhesion and hardening. Simultaneously to pressing, the impressions
30 are applied, as the press, at the surface of the pressing part which comes into contact with the upper side of the
35

aforementioned plate, is provided with said pressing plate comprising the relief which is necessary for applying impressions in accordance with the invention.

5 Preceding the pressing, according to the present invention, preferably a positioning is performed between, on one hand, the decorative layer and, on the other hand, the applied pressing plate, in order to position the printed pattern on the decorative layer and the pattern 10 present at the pressing plate over each other.

Practically, the positioning preferably is performed by shifting the base plate, together with the decorative layer and layer of synthetic material present thereupon, 15 until they obtain the desired position.

The aforementioned positioning may be performed in different manners, however, it can be realized in a particular manner by performing such positioning by means 20 of one or more marks provided on the decorative layer.

With the intention of better showing the characteristics 25 of the invention, hereafter, as an example without any limitative character, several preferred forms of embodiment are described, with reference to the accompanying drawings, wherein:

figure 1 schematically represents a part of a floor covering which is composed of panels according to the 30 invention;
figure 2 represents a panel of the floor covering from figure 1 in plan view;
figures 3 and 4 represent cross-sections according to lines III-III and IV-IV in figure 2, respectively;
35 figure 5, at a larger scale, represents a cross-section according to line V-V in figure 1;

figure 6, at a larger scale, represents a cross-section according to line VI-VI in figure 1;
figure 7, at a larger scale, represents the part indicated by F7 in figure 6;

5 figure 8 represents a view analogous as in figure 7, but whereby the panels are shifted towards each other substantially in one and the same plane;

figure 9, in cross-section, represents another panel according to the invention, with bevels provided with a print;

10 figure 10 schematically represents how the print in the embodiment of figure 9 can be provided;

figure 11 schematically represents a cross-section according to line XI-XI in figure 10;

15 figure 12, at a larger scale, represents the upper surface of a floor panel according to the invention, in particular the part indicated by F12 in figure 2;

figure 13 represents a cross-section according to line XIII-XIII in figure 12;

20 figure 14 schematically represents how plates can be realized from which floor panels according to the invention can be formed.

As represented in figures 1 and 2, the invention relates to a floor covering 1, as well as to hard panels, more particularly floor panels 2, from which such floor covering 1 is assembled, whereby these floor panels 2, at their top side 3 or decorative side, are provided with a top layer 4 with a printed wood pattern 5.

30 In the represented example, the floor panels 2 are rectangular, however, it is clear that they, according to not-represented variants, also can have another shape, for example, can be square or polygonal.

35 Preferably, the floor panels 2, at least at two opposite

10

edges 6-7, and even better, as represented in figures 2 to 8, at both pairs of edges 6-7, 8-9, respectively, are provided with coupling means 10, by means of which several of such floor panels 2 mutually can be coupled, 5 such that these coupling means 10 provide for a locking according to a direction R1 perpendicular to the plane of the floor covering 1, as well as in a direction R2 perpendicular to the edges 6-7 and/or 8-9 concerned and parallel to the plane of the floor covering 1.

10

Hereby, such coupling means 10 can be realized such that the different floor panels 2 mutually can be coupled by means of translation movements T1 and/or T2 and/or pivoting movements W1, such as indicated in figure 1, as 15 well as made clear in figures 6 to 8.

Such coupling means 10 which allow a glue-free mutual coupling of the floor panels 2, as well as an uncoupling thereof, are already known in themselves from the 20 international patent application WO 97/47834.

It is noted that the present invention, however, is not limited to floor parts with coupling means 10 which provide for a mechanical locking in the directions R1 and 25 R2, but in fact also can relate to floor panels which are provided with other coupling means, for example, with a classical tongue and groove which can be glued into each other, or even to floor panels comprising no coupling means at all.

30

Besides, the floor panels 2 either can be provided with additional particularities or not, such as bevels 11 at the upper edges, for example, such as represented in figures 3 to 10, on which, as specifically illustrated in 35 figures 9 and 10, either a decorative layer 12 is provided or not, for example, by means of transfer

printing, whereby, such as schematically represented in figures 10 and 11, a print layer 13, which is present on a carrier, is transferred to the surface of the bevels 11, for example, by means of a heated pressing roll 15.

5

The actual invention to which the present application is relating, is represented schematically in figures 12 and 13.

10 The particularity thereby consists in that at the top side of the floor panels 2, a decorative layer 16 is present, with thereover a transparent layer of synthetic material 17, in which impressions 18A-18B-18C are formed. Hereby, the decorative layer 16 and the layer of 15 synthetic material 17 are of the kind as described in the introduction and together form the top layer 4 indicated schematically in figures 3 to 10.

According to the invention, the impressions 18A-18B-18C 20 follow the printed wood pattern 5, preferably substantially in longitudinal direction as well as substantially in transverse direction and in directions situated in between.

25 As represented in figure 13, the impressions 18A-18B-18C preferably only extend up to such a depth that they are situated above the printed decorative layer 16.

As indicated by 18A and 18C, the impressions may consist 30 of successive short impressions, or, as represented by 18B, of longer, uninterrupted, possibly bent impressions. Of course, other designs are not excluded. However, it is important that the location and/or shape of the impressions is in function of the wood pattern 5, with 35 which it is meant in the first place that these impressions are realized in function of the wood nerves

and/or in function of the wood pores.

In the case of short impressions, these, such as indicated by 18A, can be directed with their length according to the printed wood nerve 19 or, as indicated by 18C, also be directed with their longitudinal direction otherwise, however, positioned such that their configuration globally follows the wood nerve 19.

10 It is noted that the three possibilities of impressions 18A-18B-18C represented in figure 12 are not limitative. Also, these will normally not be applied in combination with each other, but one well-defined type 18A or 18B or 18C or another configuration will be used.

15 According to a variant, the impressions, instead of at the wood nerve 19 itself, also can be situated in the zones formed therebetween, and/or at the transitions between the wood nerve 19 and the zones situated therebetween and/or at locations where so-called wood pores are depicted.

20 In figure 14, a form of embodiment of the method for realizing said floor panels 2, described in the introduction, is represented schematically.

25 As represented, the impressions concerned, for example 18A and/or 18B and/or 18C, hereby are formed by using a pressing mould, more particularly a pressing plate 20, which, at the side intended for coming into contact with the products to be treated, is provided with a suitable relief 21.

30 First, during production, large plates are manufactured, from which several floor panels 2 can be formed, more particularly can be sawn therefrom, which subsequently

can be provided with coupling means 10, for example, by means of a milling treatment.

For forming said plates, as schematically represented in
5 figure 14, at least a printed decorative layer 16 and a layer of synthetic material 17 are provided on a base plate 22, such in a press 23, after which the whole is compressed by means of the pressing plate 20, preferably while supplying heat.

10 According to the invention, previous to pressing, a positioning is performed between, on one hand, the decorative layer 16 and, on the other hand, the applied pressing plate 20, in order to position the printed pattern on the decorative layer 16 and the pattern present at the pressing plate 20 over each other.
15

20 In the example, this positioning is performed by shifting the base plate 22, together with the decorative layer 16 and layer of synthetic material 17 present thereon, until the desired position is achieved. This positioning is realized by means of one or more adjustable stops 24 against which the base plate 22, with the decorative layer 16 and layer of synthetic material 17 present thereupon, and possible other layers, is positioned,
25 possibly by means of marks which are applied on the decorative layer 16, which are perceived by means of one or more sensors 25, and whereby, by means of control means 26 and in function of the signals obtained from the sensors, it is provided for the control of driving means 27 of the movable stops 24.
30

Obviously, the positioning can be achieved in the two directions of the plane of the base plate 22.

35 It is evident that, according to a variant, the layer of

synthetic material and the decorative layer, already before their application on the base plate, may consist of a single layer, for example, in that the decorative layer is soaked such that sufficient synthetic material 5 is present thereupon in order to form impressions therein. It is also not excluded to start from a layer of synthetic material which is provided with a decorative layer at the underside, which layer is exclusively formed by a print. The term print must be interpreted in the 10 broadest sense, and thereby any technique is intended with which an image of a wood pattern can be realized.

Also, other layers may be taken up in the top layer, such 15 as, for example, a layer of white paper, also impregnated with resin, which is provided under the decorative layer, which has the purpose of forming a neutral underground.

The present invention is in no way limited to the forms 20 of embodiment described as an example and represented in the figures, on the contrary may such floor covering, and more particularly said panels, as well as said method, be realized in different variants without leaving the scope of the invention.

Claims.

1.- Floor covering, consisting of hard panels, with a
5 laminated structure, whereby at least at the upper
surface a printed decorative layer (16) with a wood
pattern (5) is present, with thereupon a transparent
layer of synthetic material (17) in which impressions
10 (18A-18B-18C) are formed, characterized in that the
impressions (18A-18B-18C) substantially follow the wood
pattern (5).

2.- Floor covering according to claim 1, characterized in
that the impressions (18A-18B-18C) follow the wood
15 pattern (5) substantially in longitudinal direction as
well as substantially in transverse direction and
directions situated in between.

3.- Floor covering according to any of the preceding
20 claims, characterized in that the transparent layer of
synthetic material (17) consists of a synthetic resin,
whether or not in the form of one or more transparent or
translucent material layers soaked in synthetic resin.

25 4.- Floor covering according to any of the preceding
claims, characterized in that the impressions (18A-18B-
18C) extend up to a depth, such that they still are
situated entirely above the decorative layer (16).

30 5.- Floor covering according to any of the preceding
claims, characterized in that among the aforementioned
impressions (18A-18B-18C), there are bent impressions
(18B) which follow the bent shape of the wood pattern
(5).

35 6.- Floor covering according to any of the preceding

claims, characterized in that among the aforementioned impressions, there are longer uninterrupted impressions (18B) with lengths of 3 cm or more.

5 7.- Floor covering according to any of the preceding claims, characterized in that the impressions (18A-18B-18C) are provided at least in function of the course of the wood nerves (19) of the printed wood pattern (5).

10 8.- Floor covering according to any of the preceding claims, characterized in that the aforementioned impressions comprise successive short impressions (18A-18C) which, globally, follow the nerves (19) of the wood pattern (5).

15 9.- Floor covering according to any of the preceding claims, characterized in that the impressions are provided at least in function of and, more particularly, at the location of the so-called wood pores of the 20 printed wood pattern (5).

10.- Floor covering according to any of the preceding claims, characterized in that it is provided with impressions (18A-18B-18C) which are obtained by means of 25 a pressing mould, more particularly pressing plate (20), the relief (21) of which was realized by means of image-processing technology, starting from a wood pattern, either an image of a wood pattern or a real wood pattern.

30 11.- Floor panel, characterized in that it shows characteristics as described in one or more of the preceding claims and therefore allows to realize a floor covering (1) according to any of the preceding claims.

35 12.- Method for realizing a floor panel according to claim 11, characterized in that, during the production

process of this floor panel (2), the impressions (18A-18B-18C) concerned are provided in said layer of synthetic material (17) by means of a pressing mould, more particularly a pressing plate (20).

5

13.- Method according to claim 12, characterized in that use is made of a pressing mould, more particularly pressing plate (20), the relief (21) of which was realized by means of image-processing technology, starting from a wood pattern (5), either an image of a wood pattern (5) or a real wood pattern (5).

10

14.- Method according to claim 13, characterized in that for forming, on one hand, the pressing plate (20) and, on the other hand, the patterns to be printed, one starts from one and the same wood pattern (5).

15

15.- Method according to claim 14, characterized in that, by means of image-processing, a separation is performed, on one hand, for forming one or more image layers and, on the other hand, for forming one or more structural layers.

20

25

16.- Method according to any of the claims 12 to 15, whereby the floor panels (2) are formed of larger plates and whereby during the formation of these plates, at least one printed decorative layer (16) and a layer of synthetic material (18) are provided on a base plate (22), whereby, when said layers are pressed onto the base plate (22), heat is supplied and simultaneously said impressions (18A-18B-18C) are formed, characterized in that previous to the pressing, a positioning is performed between, on one hand, the decorative layer (16) and, on the other hand, the applied pressing plate (20), in order to position the printed pattern on the decorative layer (16) and the pattern present on the pressing plate (20)

30

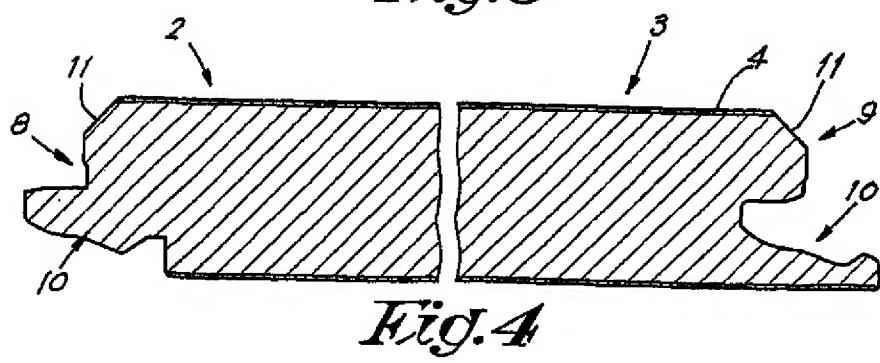
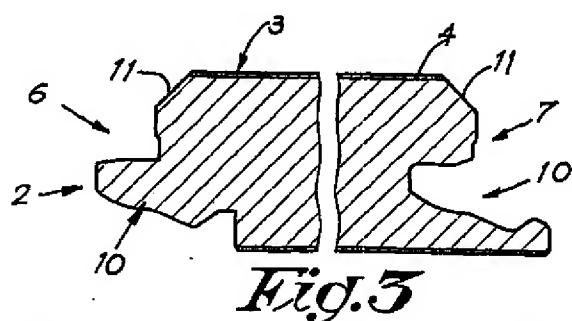
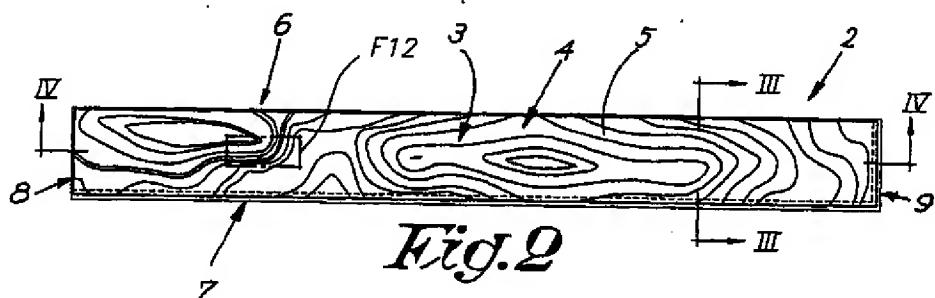
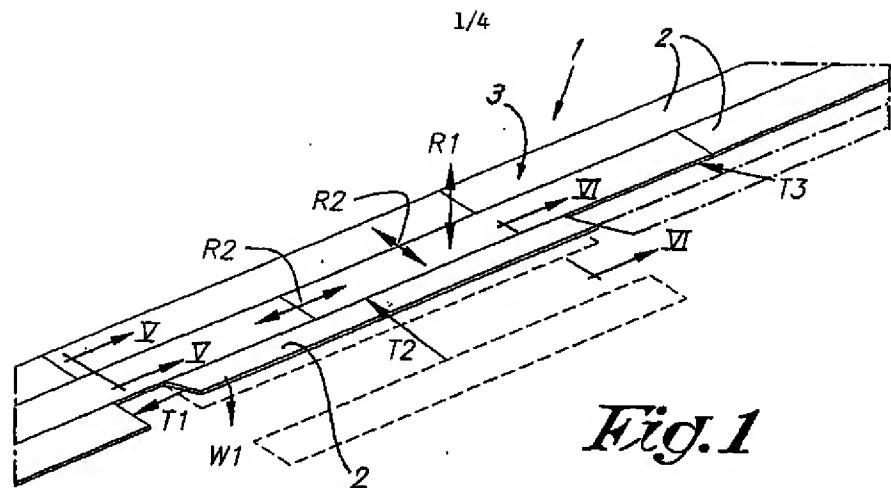
35

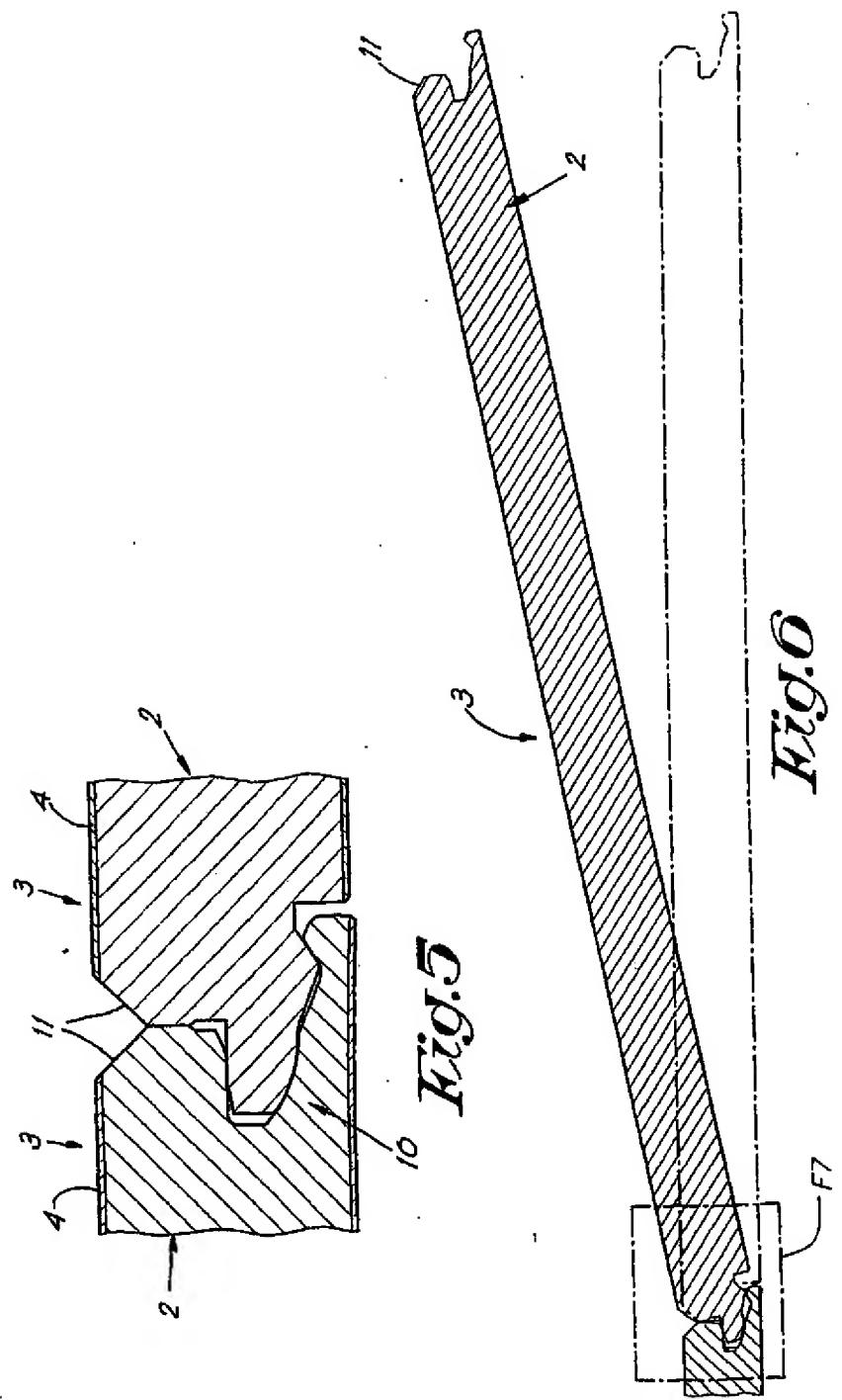
in respect to each other.

17.- Method according to claim 16, characterized in that
the positioning takes place by shifting the base plate
5 (22), together with the decorative layer (16) and layer
of synthetic material (17) present thereon until the
desired position is achieved.

18.- Method according to claim 17, characterized in that
10 the positioning of the base plate (22) and the decorative
layer (16) and layer of synthetic material (17) present
thereon is performed by means of one or more adjustable
stops (24) against which the base plate (22), together
with the decorative layer (16) and layer of synthetic
15 material (17) present thereon, is positioned.

19.- Method according to any of the claims 16 to 18,
characterized in that the positioning is performed by
means of one or more marks provided on the decorative
20 layer (16).





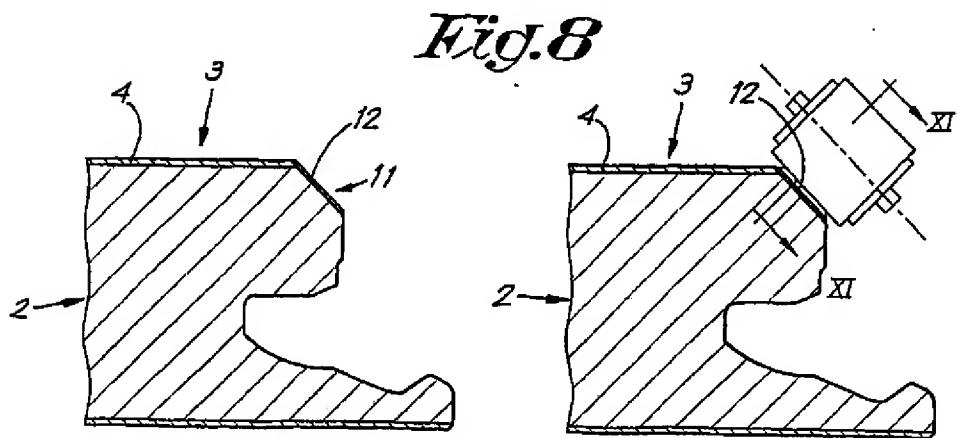
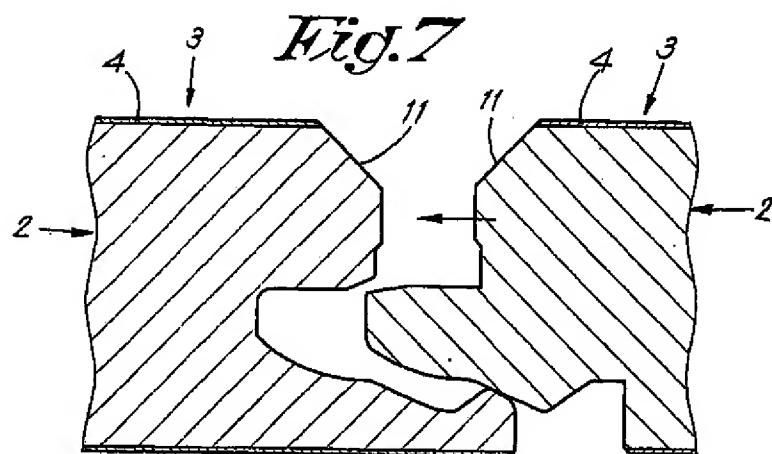
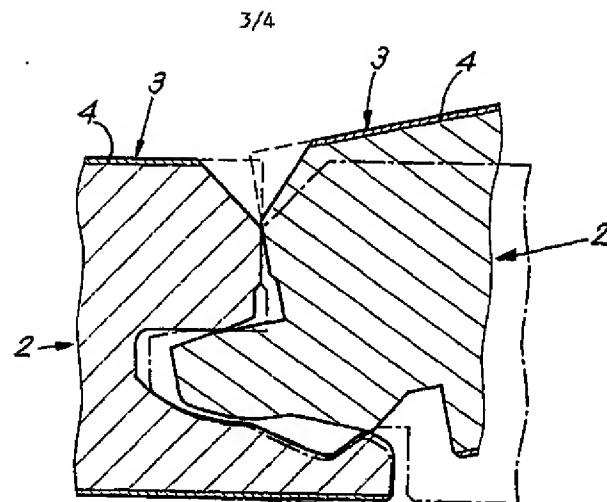
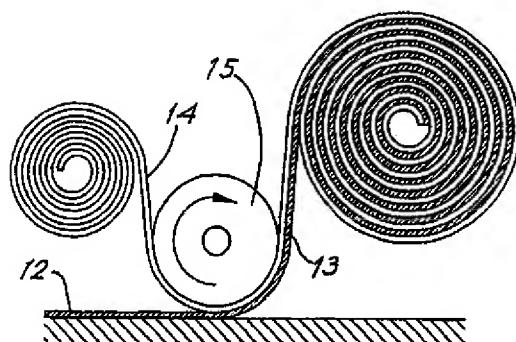
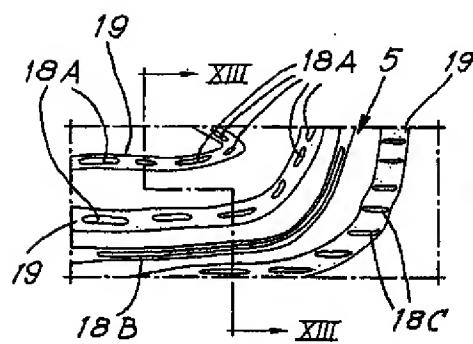
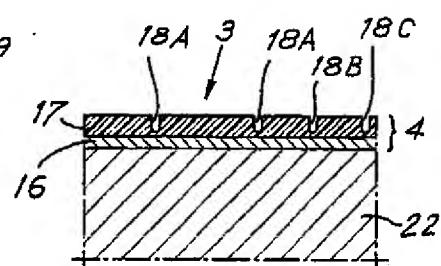
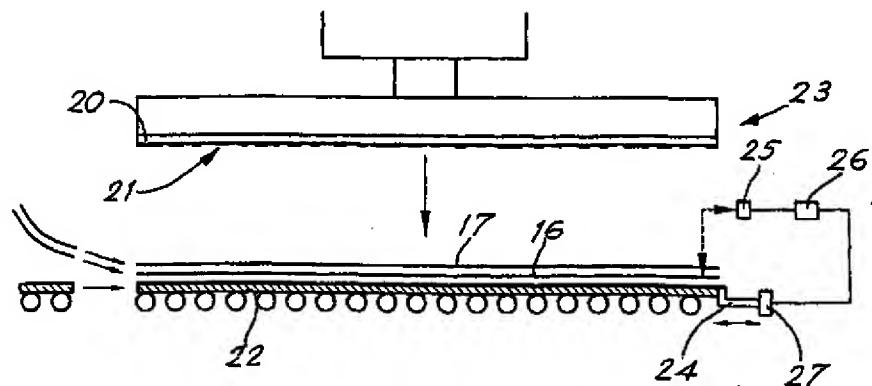


Fig. 9

Fig. 10

4/4

*Fig. 11**Fig. 12**Fig. 13**Fig. 14*

INTERNATIONAL SEARCH REPORT

Int'l Application No.
PCT/BE 01/00097

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04F15/04 B44F9/02 B44C5/04 B44C1/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04F B44F B44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 237 087 A (JONES DONALD B) 2 December 1980 (1980-12-02) column 1, line 6 -column 2, line 64; examples 1,2 ---	1-5, 7-14,16
A	US 5 804 285 A (KOBAYASHI TOSHITAKE ET AL) 8 September 1998 (1998-09-08) column 3, line 14 -column 8, line 40; figures 1-12D; example 1 ---	1-5,7,8, 10,12-16

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the International filing date but later than the priority date claimed

- *T* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *A* document member of the same patent family

Date of the actual completion of the international search

28 September 2001

Date of mailing of the International search report

08/10/2001

Name and mailing address of the ISA
European Patent Office, P.O. 5016 Patentkantoor 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax (+31-70) 340-3016

Authorized officer

Ayitter, J

INTERNATIONAL SEARCH REPORT

Information on patent family members

In	Application No
PCT/BE	01/00097

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 4237087	A	02-12-1980	NONE			
US 5804285	A	08-09-1998	JP GB	8001895 A 2291007 A ,B	09-01-1996 17-01-1996	